SURVIVAL ANALYSIS OF *BETA*-THALASSEMIA MAJOR PATIENTS

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Thalassemia is one of the most widely spread genetic diseases in the world. Among the types of Thalassemia, *Beta*-Thalassemia Major has become the deadliest disorder. Though there are survival modelling studies based on Thalassemia, most have proposed the popular Cox Proportional Hazard model (CPH). Nonetheless, due to the violation of the proportional hazards (PH) assumption, the CPH model may often not be accurate, and the findings interpreted may remain uncertain. Thus, alternative realistic models for analyzing survival data of *Beta*-Thalassemia Major patients are in need. Hence, the current research was conducted to select the best model through comparison of survival models. The analysis was performed using data from 1998-2006 on 578 *Beta*-Thalassemia Major patients at Zahedan Thalassemia Center, Iran. The research was focused primarily on implementing and comparing survival models. Modeling was performed under the Semi-parametric model: CPH and Parametric models: Accelerated Failure Time (AFT) models. The Akaike Information Criterion (AIC) and log-likelihood values were used for the model comparison. R statistical software was used for the analyses. As per the findings of the current research, the CPH model implemented for the survival of *Beta*-Thalassemia Major patients does not satisfy the PH assumption. The model with the lowest AIC (502.22) and the highest log-likelihood value (-245.1) was selected as the best model after the comparison of four parametric AFT models (Exponential, Weibull, Log-logistic and Log-normal). It was concluded that the survival time of *Beta*-Thalassemia Major patients in the southeast of Iran was distributed Weibull (scale parameter 0.487 and shape parameter 2.054) with significant factors; kind of transfused blood [Hazard Ratio $(HR) = 3.35 > 1$], haemoglobin level $(HR = 0.67 < 1)$, the annual number of transfusions $(HR = 0.85 < 1)$, and the accompanying diseases $(HR = 1.19 > 1)$. According to HR, it was found that the patients with no other accompanying diseases, a higher haemoglobin level $(> 9 \, \text{g} \, \text{dL}^{-1})$ who had received more than 12 transfusions with filtrated blood have higher survival than the counterparts. Both the Extended and Stratified Cox models will be considered for comparison as future work.

Keywords: Accelerated failure time models, *Beta*-Thalassemia major, Cox proportional hazard model, Survival analysis